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President, the Hon. Charles F. Adams, was too seriously affected in health to fulfil that duty. Impossible as it was in so brief a time for the orator to do justice to himself or the occasion, he gave an eminently graceful and appropriate discourse.

Mr. Winthrop was twice married, and three children survive him. The memory of his character and services is among the precious possessions of this century in Massachusetts.

1895. WILLIAM EVERETT.

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## ASSOCIATE FELLOWS.

### WILLIAM HOLMES CHAMBERS BARTLETT.

WILLIAM HOLMES CHAMBERS BARTLETT, for many years Professor of Natural and Experimental Philosophy in the Military Academy at West Point, contributed as much as any man to impress upon that institution its well known character. As a scientist, he was one of the first to base a system of physics on the principle of the conservation of energy; as a teacher, he was so clear and logical that he made the most complicated laws of physics and astronomy embraced in his course of instruction appear to be self-evident truths. His genial manner and personal interest in his pupils will ever be remembered with gratitude, and his magnetic influence helped to unite the officers of the army and attach them to the Union at a time when so many were tempted to join their native States.

He was born in Lancaster, Pennsylvania, in September, 1804, but his parents moved to St. Louis, Missouri, while he was yet an infant. He was appointed a Cadet at the Military Academy in 1822, graduated at the head of his class in 1826, and promoted to the rank of Second Lieutenant of Engineers. He served at the Military Academy as Assistant Professor of Engineering from 1827 to 1829; as Assistant Engineer in the construction of Fortress Monroe, Virginia, in 1828, and of Fort Adams, Newport, Rhode Island, from 1829 to 1832; as Assistant to the Chief of Engineers at Washington, from 1832 to 1834; as Acting Professor of Natural and Experimental Philosophy from 1834 to 1836; and as full Professor from 1836 to 1871, when, on his own application, he was retired from the active list for forty years of continuous service. Since his retirement he has been Actuary of the Mutual Life Insurance Company of New York. He died at Yonkers, New York, February 11, 1893.

In 1829 he was married to Harriet Whitehouse, of Newport, Rhode Island. Of eight children, three sons and two daughters survive him. His eldest daughter was the wife of General J. M. Schofield, now in command of the army, and his family has always been identified with the army and navy.

In 1837 the degree of A. M. was conferred on him by the College of New Jersey, at Princeton, and in 1847 that of LL. D. by Geneva College, New York. He has been a corporator of the National Academy since 1863, an Associate Fellow of the American Academy since 1845, and a member of the Philosophical Society of Philadelphia since 1840, and also of other societies.

He was the author of a Treatise on Optics, 1839 ; Synthetic Mechanics, 1850–58 ; Acoustics and Optics, 1852–59 ; Analytical Mechanics, 1853–59 ; Special Astronomy, 1855–58 ; — all designed for the use of the cadets of the United States Military Academy. He was also the author of "Mortuary Experience" of the Mutual Life Insurance Company of New York from 1843 to 1874 ; and of official reports and contributions to the publications of scientific societies.

His Analytical Mechanics passed through nine editions, and was used extensively throughout the country. In his Preface he says : "The design of the author is to give to the classes committed to his instruction in the Military Academy what has appeared to him a proper elementary basis for a systematic study of the laws of nature. The subject is the action of force upon bodies, — the source of all physical phenomena, — and of which the sole and sufficient foundation is the comprehensive fact, that all action is ever accompanied by an equal, contrary, and simultaneous reaction. Neither can have precedence of the other in point of time, and from this comes that character of permanence in the midst of endless variety apparent in the order of nature. A mathematical formula which shall express the laws of this antagonism will contain the whole subject, and whatever of specialty may mark our perceptions of a particular instance will be found to have its origin in corresponding peculiarities of physical condition, distance, place, and time, which are the elements of this formula. Its discussion constitutes the study of Mechanics. All phenomena in which bodies have a part are its legitimate subjects, and no form of matter under extraneous influences is exempt from its scrutiny. Astronomy, terrestrial physics, and chemistry are but its specialties ; it classifies all of human knowledge that relates to inert matter into groups of phenomena, of which the rationale is in a common principle ; and in the hands of those gifted with the priceless boon of a copious mathematics, it is a key to external nature." Twenty years later, in the ninth edition of the same work, in referring to this formula, he says: "That formula was no other than the simple analytical expression of what is now generally called the law of the conservation of energy, which has since revolutionized physical science in nearly all its branches, and which at that time was but little developed or accepted. It is believed that this not only was the first, but that it even still is the only treatise on Analytical Mechanics in which all the phenomena are presented as mere consequences of that single law."

His report of an inspection of the European Observatories, made in 1840, gave an impulse to astronomical work which resulted in the establishment of observatories in all parts of the country.

1895. W. R. LIVERMORE.

## EZEKIEL GILMAN ROBINSON.

EZEKIEL GILMAN ROBINSON, an Associate Fellow of our Academy since 1885, was born at Attleborough, Massachusetts, on March 23, 1815. It was not his good fortune to begin his life in a literary atmosphere, or to spend any of his earlier days in tumbling about in a library. His early instruction was poor, and what was bad in itself was made worse by reason of frequent changes.

Entering Brown University in 1834, he was during his first year interrupted in his work by sickness, and, discouraged by his manifest inferiority to classmates who had been more thoroughly prepared, he seemed to lose ambition. Later, however, the student's enthusiasm was awakened under Professor H. B. Hackett in Latin, and under President Wayland in ethics. But in addition to the inspiration received from his teachers, he found a strong educational stimulus in the debating society of which he was an enthusiastic and prominent member. In his enthusiastic and successful work in this debating society we discover the prophecy of the Socratic teacher and the great pulpit orator of later days; while in his choice of theme for Commencement, "The Value of Metaphysical Speculations," we detect the mental bias which was followed through scores of years of philosophic study.

After a year spent in post-graduate work he determined to study theology, and entered the Theological Institution at Newton Centre, Massachusetts. Then, according to his own testimony, he "went to work in earnest with a will and a purpose, giving his days to prescribed work, reserving an hour or two for German and associated readings